

Guidance on Emission Factors for the Mining Industry



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Disclaimer: The BAPC reserves the right to modify this guidance at any time. This document supersedes any previous documents that relate to emission factors for the mining industry issued by the BAPC.

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Section 1. Introduction

1.1. Purpose

The purpose of this document is to provide guidance to the mining industry on the selection of particulate matter emission factors based on typical site characteristics and the requirements of Nevada Administrative Code. This effort is intended to provide a transparent and consistent application in the selection of emission factors for permitting of stationary sources in Nevada.

Please contact the BAPC for alternative emission factors for site specific applications.

Section 2. Emission Factors

2.1. Scope

This section provides a compilation of various particulate matter emission factors for common processes in the mining industry. It includes emission factors and their corresponding references, the description of material types for the specific reference, any applicable federal regulations, and miscellaneous notes.

Nevada Administrative Code (NAC) 445B.239 provides direction on selecting an emission factor based on:

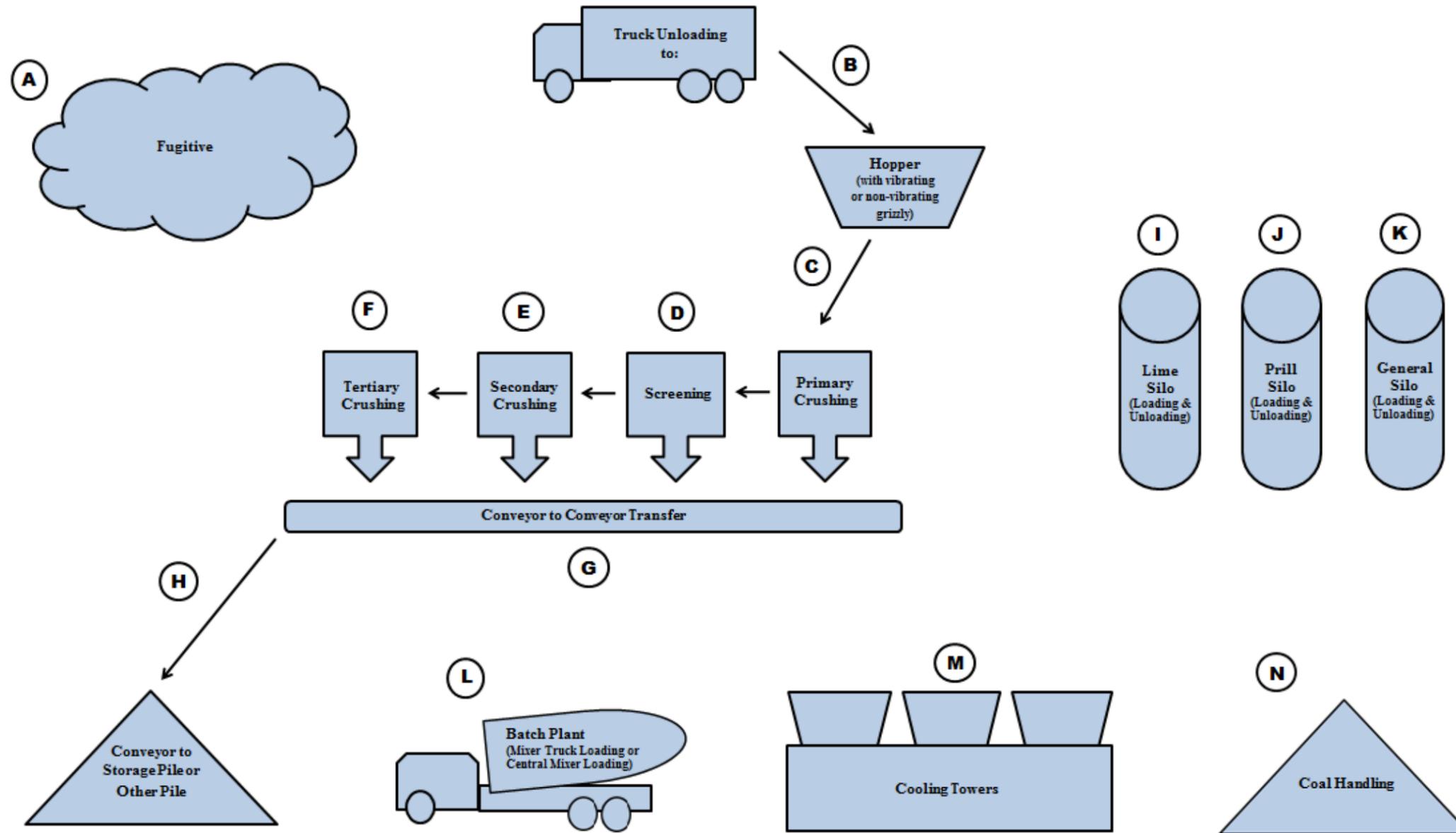
- Compilation of Air Pollutant Emission Factors, EPA Publication No. AP-42
- Material Balances
- Data from Continuous Monitors
- Manual Tests for Emission

NAC 445B.239 Modification: Rate of emission. (NRS 445B.210)

1. *The rate of emission must be expressed in pounds per hour of any regulated air pollutant discharged into the atmosphere for which a standard is applicable. The Director shall use the following to determine the rate of emission:*
 - a. *Factors of emission as specified in the latest issue of Compilation of Air Pollutant Emission Factors, EPA Publication No. AP-42, or other factors of emission determined by the Director to be superior to those in that publication, in cases where the use of factors of emission demonstrates that the level of emission resulting from the physical or operational change will either clearly increase or clearly not increase; and*
 - b. *Material balances, data from continuous monitors, or manual tests for emission in cases where the use of factors of emission does not demonstrate to the Director's satisfaction whether the level of emission resulting from the physical or operational change will either clearly increase or clearly not increase, or where an owner or operator demonstrates to the Director's satisfaction that there are reasonable grounds to dispute the result obtained by the Director using factors of emission.*
2. *When the rate of emission is based on results from manual tests for emission or systems for continuous observation, the procedures specified in Appendix C of 40 C.F.R. § 60 must be used to determine whether an increase in the rate of emission has occurred. Tests must be conducted under such conditions as the Director specifies to the owner or operator based on the representative performance of the facility. At least three valid tests must be conducted before and at least three after the physical or operational change. All operating parameters which may affect emissions must be held constant to the maximum feasible degree for each running of a test.*

2.2. General Mining Material Processes Flow Diagram.

This flow diagram depicts a typical mining operation and is intended to be used in conjunction with the *Table of General Mining Material Processes Emission Factors* that follows.



2.3. Table of General Mining Material Processes Emission Factors

Reference to Flow Diagram	Activity	Emission Factor			Emission Factor Reference	Description of Material Type(s)	Scope of Emission Factor	Note / Comments	Applicable Federal Regulations (NSPS/NESHAP)
		PM (lb/ton)	PM ₁₀ (lb/ton)	PM _{2.5} (lb/ton)					
A	Fugitive Dust from Mining Activities	NA	NA	NA	NAC 445B.22037: No person may cause or permit the handling, transporting or storing of any material in a manner which allows or may allow controllable particulate matter to become airborne.	NAC 445.075: "Fugitive dust" means emissions of solid, airborne particulate matter which could not reasonably pass through a stack, chimney, vent or a functionally equivalent opening.	Fugitive dust from mining activities includes drilling, truck loading/unloading, and haul roads, etc.		

2.3. Table of General Mining Material Processes Emission Factors (continued)

Reference to Flow Diagram	Activity	Emission Factor			Emission Factor Reference	Description of Material Type(s)	Scope of Emission Factor	Note / Comments	Applicable Federal Regulations (NSPS/NESHAP)
		PM (lb/ton)	PM ₁₀ (lb/ton)	PM _{2.5} (lb/ton)					
B	Truck Unloading to Hopper with Vibrating or Non-Vibrating Grizzly and Rock Breaker	0.0030	0.00110	0.00017	AP-42 Table 11.19.2-2: Conveyor Transfer Point (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)	Major rock types: Limestone, granite, dolomite, traprock (basalt), sandstone, quartz, quartzite. The BAPC also allows use of Chapter 11.19.2 emission factors for processing of ore and waste rock at gold mining facilities and aggregate facilities.	These emission factors apply to the truck or front-end loader unloading to hopper, to vibrating or non-vibrating grizzly, to rock breaker.	The BAPC had determined that the use of AP-42 Chapter 11.19.2-2 is appropriate for the gold mining industry given the very low fraction of gold contained in the rock. Additionally, the use of AP-42 Chapter 11.19.2-2 Controlled Emission Factors is allowed as described in the BAPC AP-42 Chapter 11.19.2 Emission Factor Decision Tree. Finally, multipliers for PM _{2.5} are based on AP-42 Chapter 13.2.4.	40 CFR Part 60, Subpart LL (METALLIC) or OOO (NONMETALLIC) STANDARDS OF PERFORMANCE FOR MINERAL PROCESSING PLANTS Per 40 CFR §60.672(d) in Subpart OOO, truck dumping is exempt from the requirements of 40 CFR §60.672 - Standard for particulate matter. (Emission Factor does not dictate subpart applicability.)
		0.12	0.06	0.01	AP-42 Table 11.24-2: Material Handling (Low Moisture Ore < 4%) (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)	Metallic Ores. Fragmented ore material from the surface or underground mine.			
		0.01	0.004	0.001	AP-42 Table 11.24-2: Material Handling (High Moisture Ore ≥ 4%) (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)				

2.3. Table of General Mining Material Processes Emission Factors (continued)

Reference to Flow Diagram	Activity	Emission Factor			Emission Factor Reference	Description of Material Type(s)	Scope of Emission Factor	Note / Comments	Applicable Federal Regulations (NSPS/NESHAP)
		PM (lb/ton)	PM ₁₀ (lb/ton)	PM _{2.5} (lb/ton)					
C	Primary Crushing and Associated Transfers In or Out (Outlet Material ≥ 4 inches diameter)	0.0054	0.0024	0.0004	AP-42 Table 11.19.2-2: Tertiary Crushing (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)	Major rock types: Limestone, granite, dolomite, traprock (basalt), sandstone, quartz, quartzite. The BAPC also allows use of Chapter 11.19.2 emission factors for processing of ore and waste rock at gold mining facilities and aggregate facilities.	These emission factors apply to all inputs to the crusher, the crushing itself, and all discharges from the crusher.	The BAPC had determined that the use of AP-42 Chapter 11.19.2-2 is appropriate for the gold mining industry given the very low fraction of gold contained in the rock; and the Tertiary Crushing Emission Factor is utilized as a conservative estimate because there is no Primary Crushing Emission Factor. Additionally, the use of AP-42 Chapter 11.19.2-2 Controlled Emission Factors is allowed as described in the BAPC AP-42 Chapter 11.19.2 Emission Factor Decision Tree. Finally, multipliers for PM _{2.5} are based on AP-42 Chapter 13.2.4.	40 CFR Part 60, Subpart LL (METALLIC) or OOO (NONMETALLIC) STANDARDS OF PERFORMANCE FOR MINERAL PROCESSING PLANTS (Emission Factor does not dictate subpart applicability.)
		0.5	0.05	0.01	AP-42 Table 11.24.2: Primary Crushing (Low Moisture Ore < 4%) (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)	Metallic Ores. Initial crushing of fragmented ore material from surface or underground mining.	These emission factors are for the primary crushing process operation as a whole, which may include a hopper or ore dump, screen(s), crusher, surge bin, apron feeder, and conveyor belt transfer points.		
		0.02	0.009	0.001	AP-42 Table 11.24.2: Primary Crushing (High Moisture Ore ≥ 4%) (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)				

2.3. Table of General Mining Material Processes Emission Factors (continued)

Reference to Flow Diagram	Activity	Emission Factor			Emission Factor Reference	Description of Material Type(s)	Scope of Emission Factor	Note / Comments	Applicable Federal Regulations (NSPS/NESHAP)
		PM (lb/ton)	PM ₁₀ (lb/ton)	PM _{2.5} (lb/ton)					
D	Screening and Associated Transfers In or Out	0.025	0.0087	0.0013	AP-42 Table 11.19.2-2: Screening (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)	Major rock types: Limestone, granite, dolomite, traprock (basalt), sandstone, quartz, quartzite. The BAPC also allows use of Chapter 11.19.2 emission factors for processing of ore and waste rock at gold mining facilities and aggregate facilities.	These emission factors apply to all inputs to the screen, the screening itself, and all discharges from the screen. The emission factor applies to any type of screen (i.e. single deck, double deck, or triple deck).	The BAPC had determined that the use of AP-42 Chapter 11.19.2-2 is appropriate for the gold mining industry given the very low fraction of gold contained in the rock. Additionally, the use of AP-42 Chapter 11.19.2-2 Controlled Emission Factors is allowed as described in the BAPC AP-42 Chapter 11.19.2 Emission Factor Decision Tree. Finally, multipliers for PM _{2.5} are based on AP-42 Chapter 13.2.4.	40 CFR Part 60, Subpart LL (METALLIC) or OOO (NONMETALLIC) STANDARDS OF PERFORMANCE FOR MINERAL PROCESSING PLANTS (Emission Factor does not dictate subpart applicability.)

2.3. Table of General Mining Material Processes Emission Factors (continued)

Reference to Flow Diagram	Activity	Emission Factor			Emission Factor Reference	Description of Material Type(s)	Scope of Emission Factor	Note / Comments	Applicable Federal Regulations (NSPS/NESHAP)
		PM (lb/ton)	PM ₁₀ (lb/ton)	PM _{2.5} (lb/ton)					
E	Secondary Crushing and Associated Transfer In or Out (Outlet Material 1 inch ≤ x < 4 inches diameter)	0.0054	0.0024	0.0004	AP-42 Table 11.19.2-2: Tertiary Crushing (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)	Major rock types: Limestone, granite, dolomite, traprock (basalt), sandstone, quartz, quartzite. The BAPC also allows use of Chapter 11.19.2 emission factors for processing of ore and waste rock at gold mining facilities and aggregate facilities.	These emission factors apply to all inputs to the crusher, the crushing itself, and all discharges from the crusher.	The BAPC had determined that the use of AP-42 Chapter 11.19.2-2 is appropriate for the gold mining industry given the very low fraction of gold contained in the rock; and the Tertiary Crushing Emission Factor is utilized as a conservative estimate because there is no Secondary Crushing Emission Factor.	40 CFR Part 60, Subpart LL (METALLIC) or OOO (NONMETALLIC) STANDARDS OF PERFORMANCE FOR MINERAL PROCESSING PLANTS (Emission Factor does not dictate subpart applicability.)
		1.2	0.16	0.02	AP-42 Table 11.24.2: Secondary Crushing (Low Moisture Ore < 4%) (Uncontrolled) PM ₁₀ utilizes Tertiary Crushing EF from AP-42 Chapter 11.24 PM _{2.5} = PM ₁₀ *(0.053/0.35)	Metallic Ores. Crushed/Screened ore material.	These emission factors are for the secondary crushing process operation as a whole, which may include a hopper or ore dump, screen(s), crusher, surge bin, apron feeder, and conveyor belt transfer points.	Additionally, the use of AP-42 Chapter 11.19.2-2 Controlled Emission Factors is allowed as described in the BAPC AP-42 Chapter 11.19.2 Emission Factor Decision Tree. Finally, multipliers for PM _{2.5} are based on AP-42 Chapter 13.2.4.	
		0.05	0.02	0.003	AP-42 Table 11.24.2: Secondary Crushing (High Moisture Ore ≥ 4%) (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)				

2.3. Table of General Mining Material Processes Emission Factors (continued)

Reference to Flow Diagram	Activity	Emission Factor			Emission Factor Reference	Description of Material Type(s)	Scope of Emission Factor	Note / Comments	Applicable Federal Regulations (NSPS/NESHAP)
		PM (lb/ton)	PM ₁₀ (lb/ton)	PM _{2.5} (lb/ton)					
F	Tertiary Crushing and Associated Transfer In or Out (Outlet Material < 1 inch diameter)	0.0054	0.0024	0.0004	AP-42 Table 11.19.2-2: Tertiary Crushing (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)	Major rock types: Limestone, granite, dolomite, traprock (basalt), sandstone, quartz, quartzite. The BAPC also allows use of Chapter 11.19.2 emission factors for processing of ore and waste rock at gold mining facilities and aggregate facilities.	These emission factors apply to all inputs to the crusher, the crushing itself, and all discharges from the crusher.	The BAPC had determined that the use of AP-42 Chapter 11.19.2-2 is appropriate for the gold mining industry given the very low fraction of gold contained in the rock. Additionally, the use of AP-42 Chapter 11.19.2-2 Controlled Emission Factors is allowed as described in the BAPC AP-42 Chapter 11.19.2 Emission Factor Decision Tree. Finally, multipliers for PM _{2.5} are based on AP-42 Chapter 13.2.4.	40 CFR Part 60, Subpart LL (METALLIC) or OOO (NONMETALLIC) STANDARDS OF PERFORMANCE FOR MINERAL PROCESSING PLANTS (Emission Factor does not dictate subpart applicability.)
		2.7	0.16	0.02	AP-42 Table 11.24.2: Tertiary Crushing (Low Moisture Ore < 4%) (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)	Metallic Ores. Crushed/Screened ore material.	These emission factors are for the tertiary crushing process operation as a whole, which may include a hopper or ore dump, screen(s), crusher, surge bin, apron feeder, and conveyor belt transfer points.		
		0.06	0.02	0.003	AP-42 Table 11.24.2: Tertiary Crushing (High Moisture Ore ≥ 4%) (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)				

2.3. Table of General Mining Material Processes Emission Factors (continued)

Reference to Flow Diagram	Activity	Emission Factor			Emission Factor Reference	Description of Material Type(s)	Scope of Emission Factor	Note / Comments	Applicable Federal Regulations (NSPS/NESHAP)
		PM (lb/ton)	PM ₁₀ (lb/ton)	PM _{2.5} (lb/ton)					
G	Conveyor to Conveyor Transfer	0.0030	0.00110	0.00017	AP-42 Table 11.19.2-2: Conveyor Transfer Point (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)	Major rock types: Limestone, granite, dolomite, traprock (basalt), sandstone, quartz, quartzite. The BAPC also allows use of Chapter 11.19.2 emission factors for processing of ore and waste rock at gold mining facilities and aggregate facilities.	These emission factors apply to all transfers from conveyors, bucket elevators, feed belts, feed augers, apron feeders, hoppers, and chutes.	The BAPC had determined that the use of AP-42 Chapter 11.19.2-2 is appropriate for the gold mining industry given the very low fraction of gold contained in the rock. Additionally, the use of AP-42 Chapter 11.19.2-2 Controlled Emission Factors is allowed as described in the BAPC AP-42 Chapter 11.19.2 Emission Factor Decision Tree. Finally, multipliers for PM _{2.5} are based on AP-42 Chapter 13.2.4.	40 CFR Part 60, Subpart LL (METALLIC) or OOO (NONMETALLIC) STANDARDS OF PERFORMANCE FOR MINERAL PROCESSING PLANTS (Emission Factor does not dictate subpart applicability.)
		0.12	0.06	0.01	AP-42 Table 11.24.2: Material Handling (Low Moisture Ore < 4%) (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)	Metallic Ores. Crushed/Screened ore material.			
		0.01	0.004	0.001	AP-42 Table 11.24.2: Material Handling (High Moisture Ore ≥ 4%) (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)				

2.3. Table of General Mining Material Processes Emission Factors (continued)

Reference to Flow Diagram	Activity	Emission Factor			Emission Factor Reference	Description of Material Type(s)	Scope of Emission Factor	Note / Comments	Applicable Federal Regulations (NSPS/NESHAP)
		PM (lb/ton)	PM ₁₀ (lb/ton)	PM _{2.5} (lb/ton)					
H	Conveyor to Storage Pile or Other Pile	0.0030	0.00110	0.00017	AP-42 Table 11.19.2-2: Conveyor Transfer Point (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)	Major rock types: Limestone, granite, dolomite, traprock (basalt), sandstone, quartz, quartzite. The BAPC also allows use of Chapter 11.19.2 emission factors for processing of ore and waste rock at gold mining facilities and aggregate facilities.	These emission factors apply to all conveyor to storage pile transfers.	The BAPC had determined that the use of AP-42 Chapter 11.19.2-2 is appropriate for the gold mining industry given the very low fraction of gold contained in the rock. Additionally, the use of AP-42 Chapter 11.19.2-2 Controlled Emission Factors is allowed as described in the BAPC AP-42 Chapter 11.19.2 Emission Factor Decision Tree. Finally, multipliers for PM _{2.5} are based on AP-42 Chapter 13.2.4.	40 CFR Part 60, Subpart LL (METALLIC) or OOO (NONMETALLIC) STANDARDS OF PERFORMANCE FOR MINERAL PROCESSING PLANTS Per 40 CFR 60.381 and 40 CFR 60.671, transfers to a stockpile are exempt from Subparts LL and OOO, respectively. (Emission Factor does not dictate subpart applicability.)
		0.12	0.06	0.01	AP-42 Table 11.24.2: Material Handling (Low Moisture Ore < 4%) (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)	Metallic Ores. Crushed/Screened ore material.			
		0.01	0.004	0.001	AP-42 Table 11.24.2: Material Handling (High Moisture Ore ≥ 4%) (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)				

2.3. Table of General Mining Material Processes Emission Factors (continued)

Reference to Flow Diagram	Activity	Emission Factor			Emission Factor Reference	Description of Material Type(s)	Scope of Emission Factor	Note / Comments	Applicable Federal Regulations (NSPS/NESHAP)
		PM (lb/ton)	PM ₁₀ (lb/ton)	PM _{2.5} (lb/ton)					
H (continued)	Conveyor to Storage Pile or Other Pile	Site Specific Calculations			<p>AP-42 Chapter 13.2.4 Equation (1):</p> $E = k(0.0032) \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$ <p>where: E = emission factor (lb/ton) k = particle size multiplier (dimensionless) U = mean wind speed (miles per hour [mph]) M = material moisture content (%)</p>	<p>Major rock types: Limestone, granite, dolomite, traprock (basalt), sandstone, quartz, quartzite. The BAPC also allows use of Chapter 13.2.4 Equation (1) for processing of ore and waste rock at gold mining facilities and aggregate facilities.</p>	<p>These emission factors apply to transfers from conveyors, bucket elevators, feed belts, feed augers, apron feeders, front-end loaders, trucks, hoppers, and chutes onto a storage or other pile that is located on the ground or in a hopper or truck.</p>	<p>Annual mean wind speed from closest meteorological station and most recent available data. Alternatively, use the default Nevada wind speed of 7.8 mph.</p> <p>Moisture determined from on-site sampling on a case-by-case basis utilizing an appropriate ASTM Method.</p>	<p>40 CFR Part 60, Subpart LL (METALLIC) or OOO (NONMETALLIC) STANDARDS OF PERFORMANCE FOR MINERAL PROCESSING PLANTS</p> <p>Per 40 CFR 60.381 and 40 CFR 60.671, transfers to a stockpile are exempt from Subparts LL and OOO, respectively.</p> <p>(Emission Factor does not dictate subpart applicability.)</p>

2.3. Table of General Mining Material Processes Emission Factors (continued)

Reference to Flow Diagram	Activity	Emission Factor			Emission Factor Reference	Description of Material Type(s)	Scope of Emission Factor	Note / Comments	Applicable Federal Regulations (NSPS/NESHAP)	
		PM (lb/ton)	PM ₁₀ (lb/ton)	PM _{2.5} (lb/ton)						
I	Lime Silo Loading	0.73	0.47	0.07	AP-42 Table 11.12-2: Cement Unloading to Elevated Storage Silo [Pneumatic] (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)	Lime, including pelletized lime.	These emission factors apply to silos whose emissions during silo loading are not controlled.	Note that AP-42 Chapter 11.17 provides emissions factors for Lime Manufacturing Raw Material and Product Processing and Handling, but does not address end use. Additionally, multipliers for PM _{2.5} are based on AP-42 Chapter 13.2.4.		
		0.00099	0.00034	0.00005	AP-42 Table 11.12-2: Cement Unloading to Elevated Storage Silo [Pneumatic] (Controlled) PM _{2.5} = PM ₁₀ *(0.053/0.35)		These emission factors apply to silos whose emissions during silo loading are controlled with a bin vent or baghouse.			
	Lime Silo Unloading	0.0048	0.0028	0.0004	AP-42 Table 11.12-2: Weigh Hopper Loading (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)	Lime, including pelletized lime.	These emission factors apply to silos to conveyor transfer, silo unloading to hopper, silo or truck unloading, and discharge of conveyor.		Note that AP-42 Chapter 11.17 provides emissions factors for Lime Manufacturing Raw Material and Product Processing and Handling, but does not address end use. Additionally, multipliers for PM _{2.5} are based on AP-42 Chapter 13.2.4.	
		0.032	0.015	0.002	AP-42 Chapter 13.2.4 Equation (1) Open Transfer: W = 7.8 mph; M = 0.468%		These emission factors apply to silo (or associated silo conveyor/feeder) unloading to a truck or pile.			

2.3. Table of General Mining Material Processes Emission Factors (continued)

Reference to Flow Diagram	Activity	Emission Factor			Emission Factor Reference	Description of Material Type(s)	Scope of Emission Factor	Note / Comments	Applicable Federal Regulations (NSPS/NESHAP)
		PM (lb/ton)	PM ₁₀ (lb/ton)	PM _{2.5} (lb/ton)					
J	Prill Silo Loading	0.02	0.007	0.001	AP-42 Table 8.3-2: Bulk Loading Operations (Uncontrolled), PM ₁₀ =PM*0.35, PM _{2.5} =PM*0.053 or PM _{2.5} = PM ₁₀ *(0.053/0.35)	Prill is ammonium nitrate prill.	These emission factors apply to silos whose emissions during silo loading are not controlled.	Multipliers for PM ₁₀ and PM _{2.5} are based on AP-42 Chapter 13.2.4.	
	Prill Silo Unloading	0.02	0.007	0.001	AP-42 Table 8.3-2: Bulk Loading Operations (Uncontrolled), PM ₁₀ =PM*0.35, PM _{2.5} =PM*0.053 or PM _{2.5} = PM ₁₀ *(0.053/0.35)				

2.3. Table of General Mining Material Processes Emission Factors (continued)

Reference to Flow Diagram	Activity	Emission Factor			Emission Factor Reference	Description of Material Type(s)	Scope of Emission Factor	Note / Comments	Applicable Federal Regulations (NSPS/NESHAP)
		PM (lb/ton)	PM ₁₀ (lb/ton)	PM _{2.5} (lb/ton)					
K	General Silo Loading (Excluding Lime and Prill)	0.73	0.47	0.07	AP-42 Table 11.12-2: Cement Unloading to Elevated Storage Silo [Pneumatic] (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)	Cement (e.g. cement, soda ash, trona, shotcrete, flocculants, water softeners, magnesium oxide, sulfur prill)	These emission factors apply to silos whose emissions during silo loading are not controlled.	Multipliers for PM _{2.5} are based on AP-42 Chapter 13.2.4.	
		0.00099	0.00034	0.00005	AP-42 Table 11.12-2: Cement Unloading to Elevated Storage Silo [Pneumatic] (Controlled) PM _{2.5} = PM ₁₀ *(0.053/0.35)		These emission factors apply to silos whose emissions during silo loading are controlled with a bin vent or baghouse.		
		3.14	1.10	0.17	AP-42 Table 11.12-2: Cement Supplement Unloading to Elevated Storage Silo [Pneumatic] (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)	Cement supplements (e.g., fly ash, coal, natural pozzolans, ground blast furnace slag, silica fume, sulfur prill)	These emission factors apply to silos whose emissions during silo loading are not controlled.		
		0.0089	0.0049	0.0007	AP-42 Table 11.12-2: Cement Supplement Unloading to Elevated Storage Silo [Pneumatic] (Controlled) PM _{2.5} = PM ₁₀ *(0.053/0.35)		These emission factors apply to silos whose emissions during silo loading are controlled with a bin vent or baghouse.		

2.3. Table of General Mining Material Processes Emission Factors (continued)

Reference to Flow Diagram	Activity	Emission Factor			Emission Factor Reference	Description of Material Type(s)	Scope of Emission Factor	Note / Comments	Applicable Federal Regulations (NSPS/NESHAP)
		PM (lb/ton)	PM ₁₀ (lb/ton)	PM _{2.5} (lb/ton)					
K (continued)	General Silo Unloading (Excluding Lime and Prill)	0.0048	0.0028	0.0004	AP-42 Table 11.12-2: Weigh Hopper Loading (Uncontrolled) $PM_{2.5} = PM_{10} * (0.053/0.35)$	Cement, cement supplements (e.g., fly ash, silica) soda ash, coal, shotcrete, trona, magnesium oxide, sulfur prill, and other similar materials	These emission factors apply to silos to conveyor transfer, silo unloading to hopper, silo or truck unloading, and discharge of conveyor.	Multipliers for PM _{2.5} are based on AP-42 Chapter 13.2.4.	
		0.032	0.015	0.002	AP-42 Chapter 13.2.4 Equation (1) Open Transfer: W = 7.8 mph; M = 0.468%		These emission factors apply to silo (or associated silo conveyor/feeder) unloading to a truck or pile.		

2.3. Table of General Mining Material Processes Emission Factors (continued)

Reference to Flow Diagram	Activity	Emission Factor			Emission Factor Reference	Description of Material Type(s)	Scope of Emission Factor	Note / Comments	Applicable Federal Regulations (NSPS/NESHAP)
		PM (lb/ton)	PM ₁₀ (lb/ton)	PM _{2.5} (lb/ton)					
L	Batch Plants - Mixer Truck Loading	1.118	0.310	0.047	AP-42 Table 11.12-2:Truck Loading [Truck Mix] (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)	Concrete batching materials (cement , cement supplement, aggregate/sand, shotcrete for mixing with water)	These emission factors apply to installations that employ water sprays, enclosures, hoods, curtains, shrouds, movable and telescoping chutes, and central duct collection systems.	The emission factor units are lb of pollutant per ton of cement and cement supplement.	
		0.098	0.0263	0.0040	AP-42 Table 11.12-2: Truck Loading [Truck Mix] (Controlled) PM _{2.5} = PM ₁₀ *(0.053/0.35)				
	Batch Plants - Central Mixer Loading	0.572	0.156	0.024	AP-42 Table 11.12-2: Mixer Loading [Central Mix] (Uncontrolled) PM _{2.5} = PM ₁₀ *(0.053/0.35)	Concrete batching materials (cement , cement supplement, aggregate/sand, shotcrete for mixing with water)	These emission factors apply to installations that employ water sprays, enclosures, hoods, curtains, shrouds, movable and telescoping chutes, and central duct collection systems.	The emission factor units are lb of pollutant per ton of cement and cement supplement.	
		0.0184	0.0055	0.0008	AP-42 Table 11.12-2: Mixer Loading [Central Mix] (Controlled) PM _{2.5} = PM ₁₀ *(0.053/0.35)				

2.3. Table of General Mining Material Processes Emission Factors (continued)

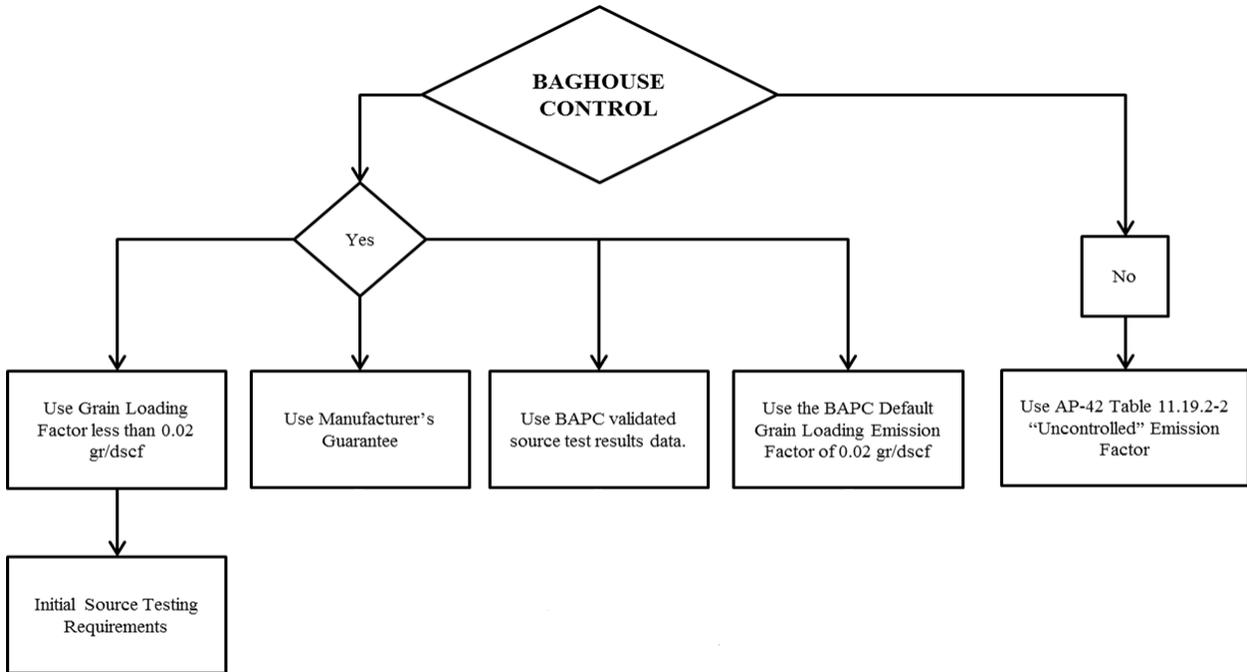
Reference to Flow Diagram	Activity	Emission Factor			Emission Factor Reference	Description of Material Type(s)	Scope of Emission Factor	Note / Comments	Applicable Federal Regulations (NSPS/NESHAP)
		PM (lb/ton)	PM ₁₀ (lb/ton)	PM _{2.5} (lb/ton)					
M	Cooling Towers	<p>PM = PM₁₀ = PM_{2.5} Emission Rate = Water Circulation Rate X Drift Elimination Rate X TDS X Density of Water</p> <p>Example: Given Water Circulation Rate = 1,000 gpm, Drift Elimination Rate = 0.02%, TDS = 1,000 ppm, and Density of Water = 8.34 lb/gal</p> <p>Emission Rate = (10,000 gpm) X (60 min/hour) X 0.02% (or 0.02/100) X 1,000 ppm (or 1,000 lb PM/1,000,000 lb) X 8.34 lb/gallon = 1 lb PM/hour</p>			AP-42 Table 13.4-1 Particulate Emissions Factors For Wet Cooling Towers			<p>The facility is required to provide a TDS sample. If the calculated emissions are less than 4,000 lb/year and the facility is an area source of HAPS, the cooling tower is considered an insignificant activity pursuant to NAC 445B.288.4 and no formal determination needs to be submitted to the BAPC.</p>	<p>40 CFR Part 63, Subpart Q (NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR INDUSTRIAL PROCESS COOLING TOWERS)</p> <p>Per 40 CFR §63.400, the provisions of this subpart apply to all new and existing industrial process cooling towers that are operated with chromium-based water treatment chemicals and are either major sources or are integral parts of facilities that are major sources</p>

2.3. Table of General Mining Material Processes Emission Factors (continued)

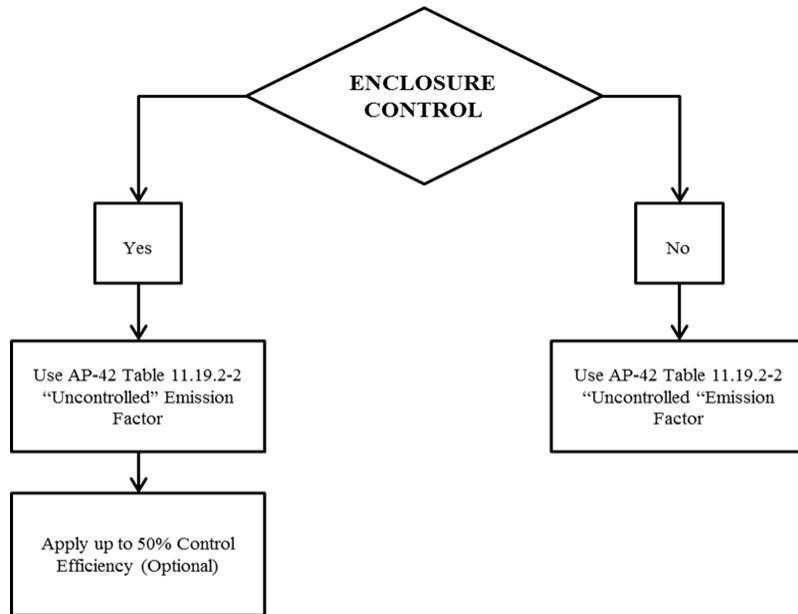
Reference to Flow Diagram	Activity	Emission Factor			Emission Factor Reference	Description of Material Type(s)	Scope of Emission Factor	Note / Comments	Applicable Federal Regulations (NSPS/NESHAP)
		PM (lb/ton)	PM ₁₀ (lb/ton)	PM _{2.5} (lb/ton)					
N	Coal Handling	0.0070	0.0025	0.00037	AP-42 Table 11.9-4 End Dump Truck Unloading (Batch Drop) (Uncontrolled) PM ₁₀ = PM*0.35 PM _{2.5} = PM ₁₀ *(0.053/0.35)	Coal	These emission factors apply to truck unloading to hopper with vibrating or non-vibrating grizzly, crushing and associated transfers, screening and associated transfers, and conveyor to conveyor transfer.	Multipliers for PM _{2.5} are based on AP-42 Chapter 13.2.4.	40 CFR Part 60, Subpart Y (STANDARDS OF PERFORMANCE FOR COAL PREPARATION AND PROCESSING PLANTS)
		0.0069	0.0024	0.00037	AP-42 Table 11.12-2 Aggregate Transfer (Uncontrolled) PM ₁₀ = PM*0.35 PM _{2.5} = PM ₁₀ *(0.053/0.35)				
		Site Specific Calculations			AP-42 Chapter 13.2.4 Equation (1): $E = k(0.0032) \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$ where: E = emission factor (lb/ton) k = particle size multiplier (dimensionless) U = mean wind speed (miles per hour [mph]) M = material moisture content (%)		These emission factors apply to all conveyor to storage pile transfers.		

2.4. AP-42 Chapter 11.19.2 Emission Factor Decision Tree

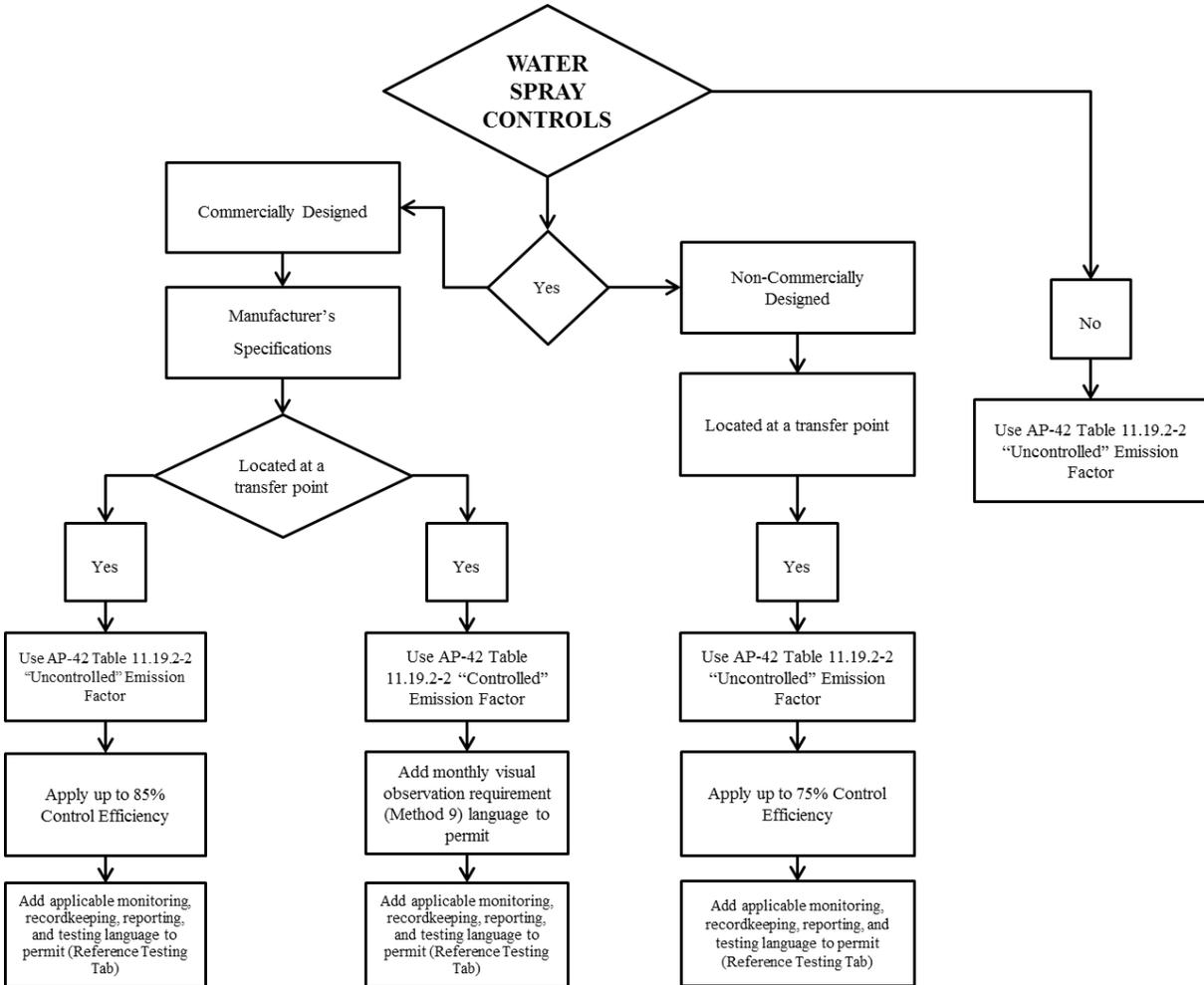
The following decision trees are intended to assist in the selection of appropriate emission factor for per control type. Control types include baghouses, enclosures, and water sprays. The diamonds signify choices while the rectangles represent the outcome.



2.4. AP-42 Chapter 11.19.2 Emission Factor Decision Tree (continued)



2.4. AP-42 Chapter 11.19.2 Emission Factor Decision Tree (continued)



2.5. Frequently Asked Questions (FAQs)

BAGHOUSE CONTROL		
1	Can I use baghouse "controlled" emission factors on a bin vent?	No, however, you may use AP-42 Chapter 11.12 Controlled Emission Factors for Bin Vents.
2	I have a specific grain loading factor I want to use. Do I need to provide the Manufacturer's Guarantee for my baghouse control with that information?	Yes, otherwise the BAPC Default Grain Loading Emission Factor of 0.02 gr/dscf will be used.
3	What if I do not want to use the BAPC's Default Grain Loading Emission Factor for my baghouse control?	You can provide the Manufacturer's Guarantee specifying the specific grain loading factor for the baghouse control, use a larger grain loading factor than the BAPC's default, or use the most recent BAPC approved source test results. For new sources (or existing sources that have yet to be source tested), a grain loading factor less than the BAPC default may be used to derive an emission limit; however, initial source testing will be required to ensure that the requested emission limit is not exceeded.
4	Can I use source test results from other facilities for my baghouse control?	Yes, but at the discretion of the BAPC. All source tests results submitted to the BAPC for consideration must have been performed on a similar process, and conducted within the state of Nevada. The source test protocol and final results must have previously been validated by the BAPC. Additionally, initial source test requirements will apply.
5	What if my emissions are based on a grain loading factor less than 0.02 gr/dscf and the initial source test results exceed the emission limit(s)?	The emission unit(s) will be out of compliance with the emission limit(s) requested and will be subject to a potential violation. Consequently, you will need to revise the permit to reflect the actual source test data.

2.5. Frequently Asked Questions (FAQs) (continued)

ENCLOSURE CONTROL		
1	What qualifies as an enclosure control?	An enclosure must have a solid cover surrounding the transfer point. This excludes entries and exits. Transfer points must not be clearly visible.
2	What is the maximum control efficiency I am allowed for my enclosure control?	The maximum control efficiency you can utilize for an enclosure is 50 percent. "Controlled" emission factors may not be used in conjunction with an added control efficiency.
3	I have a fully enclosed unit (i.e. fully enclosed screw conveyor), what does that mean for me?	A fully enclosed unit will not be considered a source of emissions, but will be described in the permit under a system name or another permitted emission unit. The BAPC requires photographic documentation to verify the unit is fully enclosed.

2.5. Frequently Asked Questions (FAQs) (continued)

WATER SPRAY CONTROLS		
1	<p>What does the BAPC consider a "Commercially Designed" water spray?</p>	<p>It is a water spray (which may or may not use surfactants) designed specifically for dust suppression. Manufacturer's specifications of the commercially designed water spray must be included. Installation, operation, and maintenance of the water spray must follow manufacturer's specifications, which shall be kept on site at all times.</p>
2	<p>What does the BAPC consider a "Non-Commercially Designed" water spray?</p>	<p>It is a water spray that is not commercially designed specifically for dust suppression. Examples include garden hoses, residential lawn sprinklers, PVC piping with holes, etc.</p>
3	<p>If I am using a "Commercially Designed" water spray, when can I utilize AP-42 11.19.2 "controlled" emission factors?</p>	<p>In order to utilize "controlled" emission factors, a commercially designed water spray must be located at EVERY transfer point where the "controlled" emission factor is to be applied. Additional monitoring requirements will also be added to the permit. For crushers and screens, commercially designed water sprays must be strategically located in order to apply the "controlled" emission factor.</p>
4	<p>What if I am using a "Commercially Designed" water spray but do not want additional monitoring requirements added to my permit?</p>	<p>You may utilize "uncontrolled" emission factors and apply an 85% control efficiency. The water spray must be located at EVERY transfer point where the 85% control efficiency is to be applied. For crushers and screens, a commercially designed water spray must be strategically located in order to apply an 85% control efficiency.</p>

2.5. Frequently Asked Questions (FAQs) (continued)

GENERAL QUESTIONS		
1	What pollutants are covered under AP-42 Chapter 11.19.2?	This chapter covers Particulate Matter (i.e. PM, PM ₁₀ , PM _{2.5}) only.
2	What if my system has multiple air pollution controls?	The applicant may only claim the reduction of one control. This may be a control efficiency or an emission factor.
3	Can I apply control efficiencies to an AP-42 Chapter 11.19-2 "controlled" emission factor?	The BAPC considers this "double-dipping" and it is not allowed. Control efficiencies can only be applied to "uncontrolled" emission factors. Emissions based on a "controlled" emission factor cannot claim additional reduction from a control efficiency. Control efficiencies are not additive.
4	What if my material is saturated?	Saturated material means mineral material with sufficient surface moisture such that particulate matter emissions are not generated from processing of the material through screening operations, bucket elevators and belt conveyors. Material that is wetted solely by wet suppression systems is not considered to be "saturated" for purposes of this definition. The facility must provide documentation proving that the material is saturated. The system associated with the saturated material may still be permitted, but with zero emissions and zero percent opacity.

2.5. Frequently Asked Questions (FAQs) (continued)

GENERAL QUESTIONS (continued)		
5	What if I have an agglomerator or wet trommel?	The agglomerator or wet trommel unit itself will be permitted with zero emissions and zero percent opacity. The applicant may utilize AP-42 Chapter 11.19 "uncontrolled" emission factors in conjunction with 85% control efficiency for the direct discharge of material from the agglomerator or wet trommel to a conveyor, and any subsequent transfer points thereafter. The wet trommel is subject to NSPS Subpart LL requirements.
6	What if I have a dry trommel?	The dry trommel itself will be permitted as a screen, along with its associated transfers in and out. This unit is subject to NSPS Subpart LL requirements.
7	What if I have a wet mill?	The wet mill is not considered an emission unit, because saturated material is required by the equipment. Therefore, it will not be permitted but will be included in the process description for the unit immediately preceding the wet mill.
8	What if I have a dry mill?	A dry mill will be permitted. This unit is subject to NSPS Subpart LL requirements.
9	Can I take credit for naturally occurring moisture in my material?	The BAPC currently does not accept additional credit for naturally occurring moisture.